Dermofat grafts to the extraconal orbital space

G E Rose, R Collin

Abstract
Dermofat grafts were placed in the upper or lower lid sulci in 35 subjects, aged from 11 to 59 years, to improve the cosmesis of volume deficient sockets or prevent tissue adhesion. Volume enhancement and cosmetic improvement were achieved in 31 patients, in whom useful vision was present in 13/22 after previous trauma, in 4/4 with facial clefiting, and in 3/3 with orbital or facial fat atrophy. Grafts were used successfully in nine patients to prevent scar formation after division of adhesions between the eyelids or levator muscle and the orbital margins. A reduction of the bulk of upper-lid grafts was required in three cases; histopathology of the excised fat showed relatively minor degrees of inflammation, atrophy, and fibrosis.

Since the introduction of dermofat grafting, the most common ophthalmic use has been the augmentation of soft tissues in volume deficient sockets after enucleation; such grafts are placed within the residual tissues of the intracranial space. Unlike non-autogenous materials used for volume augmentation dermofat grafts (being autogenous) have negligible risk of rejection, although there is some tendency for lipolysis and resorption of adipose tissue in the early post-operative period.

Free dermofat may be grafted into the extraconal spaces, where the dermis is opposed to the peristemeum of the orbital rim or to other suitably vascularised structures; in this situation the grafts can provide both volume augmentation and a valuable barrier to the formation of scar tissue.

The results of dermofat grafting to the extraconal orbital space in 35 patients are reviewed in this paper.

Patients and methods
Patients having extraconal dermofat grafting between 1980 and 1991 were identified from the surgical records at Moorfields Eye Hospital.

All surgery was performed under general anaesthesia. The dermofat graft was taken from the buttock, at a point half-way between the ischial tuberosity and ipsilateral greater trochanter, using well-established techniques. Parenteral antibiotics were given at the time of harvesting the tissue.

EXTRACONAL DERMOFAT GRAFTS FOR VOLUME DEFICIENT SOCKETS
For volume deficient sockets with deep upper-lid sulci the orbital rim was approached through a skin crease incision at a level determined pre-operatively. The orbital septum was divided and the fat along the anterior part of the orbital roof displaced inferiorly. The dermal surface of the dermofat graft was attached to the peristemeum of the orbital roof using 6/0 polyglycolic sutures, with care being taken to avoid damage to the supraorbital neurovascular bundle and the trochlea. The skin crease was reformed by sutures attached to the anterior part of levator muscle or aponeurosis.

A subcutaneous blepharoplasty approach was used for dermofat grafting to the interior orbital rim. The rim was approached in a similar fashion to the upper lid and the graft secured to the anterior periosteum of the orbital floor.

EXTRACONAL DERMOFAT GRAFTS FOR PREVENTION OF TISSUE ADHERENCE
Areas of adhesion between lid tissues and orbital rim were approached as in the volume deficient sockets. Tissue adhesions were separated with respect for natural tissue planes, and any necessary repair of tissues (such as levator muscle) performed. The dermofat graft was then sutured to the periosteum overlying the site of tissue adherence and the superficial layers closed.

In some cases other measures, such as medial canthoplasty or lateral tarsorrhaphy, were used.

Table 1  Extracranial dermofat grafts in 35 patients

<table>
<thead>
<tr>
<th>Reason for dermofat grafting</th>
<th>Status of the eye</th>
<th>Initial ocular/orbital pathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 cases for cosmetic improvement</td>
<td>Sighted* eyes (13)</td>
<td>9 post-traumatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 post-operative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 hemifacial atrophy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 blepharochalasis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 maxillary dysplasia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 post-traumatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 tumours</td>
</tr>
<tr>
<td>4 cases for tissue separation</td>
<td>Sighted* eyes (4)</td>
<td>1 post-traumatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 facial clefts</td>
</tr>
<tr>
<td>5 cases for tissue separation and cosmetic improvement</td>
<td>Sighted* eyes (3)</td>
<td>3 post-traumatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 post-irradiation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 post-traumatic</td>
</tr>
</tbody>
</table>

*Sighted* denotes an acuity of finger-counting or better.

Table 2  Ocular characteristics for patients undergoing dermofat grafting to the extraconal orbital space

<table>
<thead>
<tr>
<th>Ocular characteristics</th>
<th>Mean value</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of upper lid sulcus (graduated 0–3)</td>
<td>2-4</td>
<td>29</td>
</tr>
<tr>
<td>Postoperative</td>
<td>0-7</td>
<td>29</td>
</tr>
<tr>
<td>Depth of lower lid sulcus (graduated 0–3)</td>
<td>1-1</td>
<td>10</td>
</tr>
<tr>
<td>Postoperative</td>
<td>0-3</td>
<td>10</td>
</tr>
<tr>
<td>Degree of enophthalmos (graduated 0–3)</td>
<td>1-3</td>
<td>35</td>
</tr>
<tr>
<td>Postoperative</td>
<td>1-3</td>
<td>35</td>
</tr>
<tr>
<td>Palpebral aperture (affected side; mm)</td>
<td>8-9 (9-9)*</td>
<td>34 (33)*</td>
</tr>
<tr>
<td>Postoperative</td>
<td>7-8</td>
<td>30</td>
</tr>
<tr>
<td>Levator function (affected side; mm)</td>
<td>9-0 (14-4)*</td>
<td>31 (31)*</td>
</tr>
<tr>
<td>Postoperative</td>
<td>8-2</td>
<td>29</td>
</tr>
</tbody>
</table>

* Values for the unaffected (healthy) side, where appropriate.
to help eyelid closure and the eyelid was placed on traction if needed.

Ocular characteristics were graded from the case notes and, where possible, from clinical photographs. Subjective measures were arbitrarily graded as '0', ‘1' (mild), ‘2' (moderate), or ‘3' (marked) and other measurements, such as palpebral aperture or levator function, were assessed using standard methods.

Results
Thirty five patients (15 male, 20 female), aged from 11 to 59 years, underwent extraconal dermofat grafting to the right, left, or both sockets (20, 13, and two cases, respectively); grafts were placed in the upper eyelid (29 cases) or lower eyelid sulcus (10 cases). Follow-up intervals were from 4 months to 7 years (median 1 year).

Sulcus dermofat grafts were performed in 22 sockets after previous trauma; enucleation has been performed in six cases and 13/16 remaining had sighted eyes (Table 1). After prior ocular surgery or tumour six patients had grafts solely for volume augmentation (five enucleated) whereas one enucleated socket was grafted also to prevent tissue adhesions (Table 1). Three

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Fig 1A

Figure 1 A deficiency of soft tissue volume is present in the right orbit after blowout fracture; although the upper lid sulcus is very deep, the vision, ocular movements, and eyelid movements are all normal (A, B).

Fig 1B

Fig 2A

Figure 2 The same patient as Figure 1, 3 months after dermofat grafting to the upper eyelid sulcus; eyes (A) open, (B) closed.

Fig 2B

Fig 3A

Figure 3 Patient with bilateral lower lid retraction (A), lagophthalmos (B) and secondary corneal exposure; there is adherence of malar scars to the maxillae, which were advanced during surgery for Apert's syndrome.

Fig 3B

Fig 4A

Figure 4 Same patient as Figure 3, 6 months after freeing of tissue adhesions and dermofat grafting on the inferior orbital rims; the grafts reduce adherence of scar tissues and improve the malar profile. Eyes (A) open, (B) closed.
fibrosis

dermofat

significant

after grafting

structure

lid sulcus.

maintained.

e- grafted

for volume

blepharochalasis

syndrome,

patients

had

atrophy,

patients

were

grafted

for volume deficient sockets, whereas

three other patients with facial clefts had grafts to

prevent tissue adherence between the eyelids and

orbital margins; all six of these patients had

sighted eyes. Dermofat grafting was combined with

other procedures to the upper eyelid in

eight patients – namely, levator muscle resection

(six cases), recession of the upper-lid retractors

(one case), and entropion repair (one case).

There were no intraoperative complications

even in cases where the orbital roof had been

damaged at initial injury. As a result of surgery,

however, two patients developed a transient

supraorbital neuropathia. Lipolysis occurred in

many grafts and a minimal discharge of liquified

fat from the skin incision was quite common.

One patient developed a staphylococcal abscess

at 2 months after surgery, which resolved with

drainage and systemic antibiotics; there was

however, marked reabsorption of fat from the

graft and subsequent adhesion between the eyelid

and the orbital margin.

Despite reabsorption of fat there was good

augmentation of tissue volume and reformation of

the upper-lid skin crease with all grafts (Table

2; Figs 1 and 2). Similarly where the graft was

used as a ‘spacer’ there was a satisfactory

prevention of tissue adhesion which improved

eyelid movements (Figs 3 and 4); in the overall

group of 35 patients, however, there was a

tendency to a slight reduction of palpebral

aperture (due to gravitational ptosis) but almost

no change in the elevator function (Table 2).

Five patients had anterior approach ptosis

surgery as a secondary procedure (three planned

before dermofat grafting). The bulk of the graft

was too great in four patients and three had a

secondary debulking (one with ptosis correction,

one with skin crease reformation).

Discussion

Free dermofat grafts into the extraconal space

are useful for augmenting the tissues within

volume deficient sockets. The grafts, placed in

the upper and/or lower sulci, are particularly

useful where volume has already been augmented

by intracanal1 and orbital floor implants,2,3 or

where there is a sighted eye and orbital floor

implantation would carry a significant risk of

optic nerve damage.

Volume enhancement was the prime indication

for dermofat grafting in 26/35 patients in this

series, of whom one half had usefully sighted

eyes (Table 1; Figs 1 and 2); enhancement of

socket volume had been performed where possible

by intracanal and orbital floor implantation. There were five patients in whom

volume enhancement was a secondary gain after

the prime necessity for a ‘spacer’ to prevent

tissue adhesions; three of these five patients had

sighted eyes (Table 1; Figs 3 and 4). The aim in

all patients was to slightly overcorrect volume

deficiency, to allow for postoperative fat

reabsorption, and loss of tissue volume was not a

significant problem (Figs 2 and 4). All 31 patients

had a satisfactory reduction in the depth of the

eyelid sulci, although the grafts remained too

bulky in four patients and were surgically

reduced in three cases.

The anterior approach to grafting the upper

lid allows both reformation of the skin crease and

also surgery to correct ptosis or upper-lid

entropion. A postoperative ptosis is common

after upper-lid grafting but typically improves as

reabsorption of the fat and tissue oedema occurs;

secondary ptosis surgery was needed in 5/31

patients and had been expected in three of these

five cases.

Mobile tissues, such as the eyelids or levator

muscle, may become adherent to the fixed orbital

margins after trauma; after surgical separation a

re-adherence of these tissues is almost inevitable

unless the two surfaces are kept apart by the use

of a ‘spacer’ – such as dermofat or silicone sheet.

A dermofat graft is less liable to extrusion or

infection than non-autogenous materials, the

risk of infection being particularly great in

post-traumatic cases where sinus fractures are fairly

common. Unlike silicone sheet, which tends to

be prominent when placed near the orbital

margin, dermofat grafts have a smoother contour

when straddling the orbital rim – a position often

required for ‘spacer’ grafts (Fig 4).

The primary indication for dermofat grafting

in nine patients was to provide a ‘spacer’ and in

eight of these the scars were either post-traumatic

or postoperative (Fig 3). Eye closure was

improved in all cases and the position and

movements of the upper (six cases) or lower

(three cases) eyelids were better. In some of this

group the visual acuity improved after surgery as

the preoperative exposure keratopathy resolved.

With the exception of one patient, in whom

the graft became infected, the degree of post-

operative fat reabsorption was not sufficient to

improve the surgical results. Where the dermofat

graft required debulking it is of particular interest

that the excised tissue from two cases showed

only minimal inflammatory cell infiltrates or

fibrosis and that the cellular architecture for the

adipose tissue was very well maintained (Fig 5);

this finding of almost normal fat architecture is

similar to that in another report.4

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